Forest Health in Utah

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Report prepared by:

Utah Department of Natural Resources
Division of Forestry, Fire and State Lands

Executive Summary

This report addresses forest health issues on private and public lands in Utah.

Several factors have contributed to the decline of forest health in Utah, including past logging practices, past grazing patterns, and fire exclusion. These factors have resulted in forests that are denser, less diverse with greater abundance of late successional species, with an accumulation of large amounts of woody debris and increased fuel loads. The current drought has exacerbated these conditions, and consequently Utah's forests have become more susceptible to intense wildfire, insects and diseases.

Because of generally high stand densities, greater than 90% of Utah's forested landscapes currently have a moderate to high risk of catastrophic wildfire. Wildfires affecting mixed species stands and densely stocked sites tend to be severe, causing adverse impacts to soil, important wildlife habitat and recreation resource values. Although high elevation forests comprise only 10% of Utah's land base, most are important watersheds. Severe wildfires in these forests could reduce the quality and quantity of water needed by local communities. Suppressing large, intense fires is also expensive. As development continues along the urban-wildland interface, these costs are expected to escalate. During the year 2002, nearly $15 million of state and county funds were spent in fire suppression. Federal agencies spent just over $67 million on fire suppression in Utah. These figures do not include the cost of rehabilitating affected watersheds.

Approximately 2.2 million acres of Utah's forests are also rated moderate to highly susceptible to bark beetle attack (see Utah Forest Health Report; A Baseline Assessment 1999-2001). High stand densities often place trees under stress as they compete for available water and soil nutrients. Stressed trees are more susceptible to insect attack. In Utah, bark beetles kill more trees annually than are lost to wildfire. Since 1999, approximately 1.7 million trees have been lost to bark beetle infestation, often in association with the effects of prolonged drought. Since landscape-level tree mortality caused by bark beetles may take years to develop, apparent impacts are often less dramatic than those of fire in the short term. Recent outbreaks, however, have resulted in landscapes comprised of thousands of dead trees.

Many techniques employed today to suppress bark beetle outbreaks are only effective in the short term and do not address the underlying forest health issues. Large-scale treatments to reduce stand densities and enhance diversity would prove the most effective long term bark beetle management within susceptible landscapes. Thinning, for example, alters species and age class diversity, providing a stable and sustainable forest that is less susceptible to large-scale insect outbreaks.

The effects of forest diseases, such as dwarf mistletoe, root diseases, and decay, are subtler than the effects of insects. Over long periods, forest diseases can cause a profound impact on forest structure, composition, and the pattern of forest succession. With the exception of forests that have just experienced an outbreak of bark beetles, the impact of forest diseases over the lifespan of a forest is often more serious than that of forest insects or forest fire.

Noxious and invasive weeds pose a new and serious threat to Utah's forests. Several species including knapweeds, leafy spurge, dyers woad and thistles are spreading at an alarming rate, reducing biological diversity, modifying wildlife habitats, altering fire and nutrient cycles, degrading soil structure, and damaging critical watersheds. Utah has 18 declared noxious weed species and another 14 species classified as new and invading. Between 2.5 and 3 million acres are already infested, with an additional 350,000 new acres added annually.

Forest health issues often extend across forest types, ownerships, and political boundaries. There are more people living adjacent to or utilizing forests than ever before, and our dependence on forests for precious resources creates a greater need for proactive management. The appropriate use of mechanical treatments, prescribed fire, and thinning is needed to reduce the risk of catastrophic wildfire, insect outbreaks, diseases, and noxious and invasive weeds. Emergency action exemptions from federal guidelines, not to exceed 250 acres, would allow suppression of insect and disease infestations and noxious weed invasions. Ensuring that local forest enterprises have a continuous supply of wood will enhance the effectiveness of a comprehensive preventative strategy and stabilize or enhance rural economies.

Introduction

Utah's forests are critical for clean water, recreation, grazing, wildlife habitat, and forest products. The health of these forests is declining. This report summarizes the health of Utah's forests and makes recommendations for their future.

What is "forest health"?

There are many definitions of "forest health"; we use it in the following context:

A healthy forest displays resilience to disturbance by maintaining a diverse set of structures, compositions, and functions across the landscape.

Healthy forests best meet people's needs for products, services, and amenities because they have the ecological capacity to recover from disturbance.

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Several factors have contributed to the decline in forest health including past logging practices, past grazing patterns, and fire exclusion. Drought currently is exacerbating these human-caused problems. The overstory canopy in many of today's forests is more dense and uniform in age, species compositions are changing, and large amounts of woody debris are accumulating. Because of these changes, most of Utah's forested landscapes are now at moderate to high risk from catastrophic wildfire, and approximately 2.2 million acres of Utah's forests are rated moderate to highly susceptible to bark beetle attack (see Utah Forest Health Report; A Baseline Assessment 1999-2001). Some forests are disappearing completely and will not be replaced in our lifetimes.

Some factors that contribute to forest health decline, such as drought, are beyond our control; but many factors we can influence if we choose to take action. Trees can be harvested to reduce fire hazard and reduce the risk for insect outbreaks, prescribed fire can reduce fuel loads, and forests can be monitored for emerging health problems. Timber harvest and fire also can be used to regenerate disturbance-dependent species like aspen.

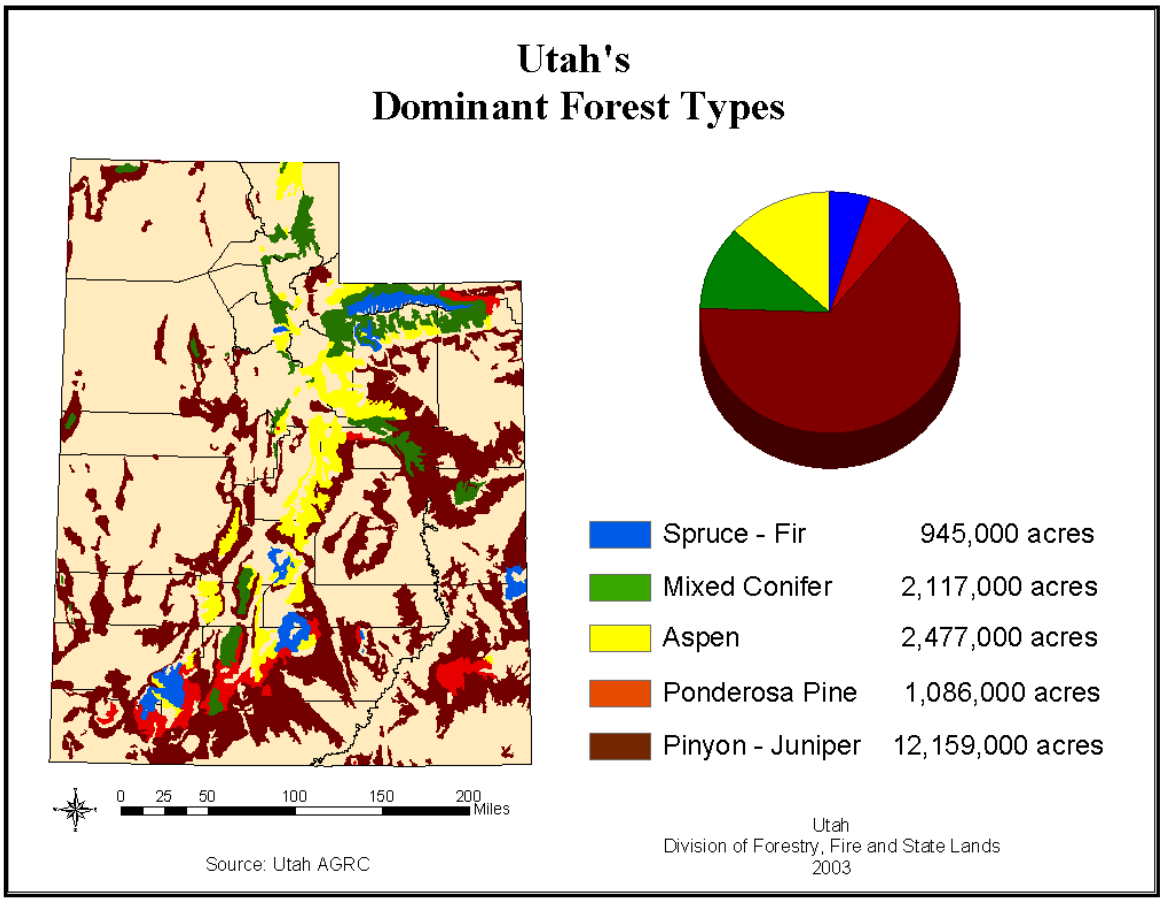
Hands-off management, or lack of management, is advocated by some as best simulating nature. It is true that natural processes often work best and can produce stable, sustainable ecosystems. However, many of our forests are so altered after more than a century of fire suppression and other human effects, that letting nature take its course may not be possible. Instead, we can manage actively, in concert with nature, to make our forests more diverse, resilient, and sustainable. This is the essence of professional forestry.

Our goal is to improve the public's knowledge and awareness of forest health issues and their importance. Our cooperative programs provide education and technical assistance to landowners and forest managers. Through improved communication about forest health issues, we seek to facilitate forest health restoration activities in Utah.

Forest Types and Ownership

Forest type or forest cover consists of the dominant tree species comprising the forest canopy for a given area. Forest types are influenced by climate, elevation, aspect, soil, and disturbance history. Utah has five main types that make up most of our forestland.

Figure 1 Major Utah Forest Types



Spruce-fir forests occur at the highest elevations, between 10,000 and 11,500 feet. The main tree species include Engelmann spruce and subalpine fir. These forests are important for snow retention, and water quality and quantity. In addition, spruce wood is quite valuable.

Mixed conifer forests occur at elevations from about 8,000 to 10,000 feet. Douglas-fir, white fir, and lodgepole pine are the main tree species in this type. Spruce, subalpine fir, and ponderosa pine may also be a component of mixed conifer forests. Species diversity in this habitat type contributes to wildlife habitat diversity. Watershed values are important, as well as the presence of some valuable timber species.

Aspen is commonly found between 7,500 and 10,500 feet. This forest type is very important for landscape diversity, aesthetics, and wildlife habitat. In addition, aspen forests yield more water than conifer types in similar environments. Aspen wood is low in value, but can be made into pallets, paneling, and other products if available in quantity.

Ponderosa pine forests occur mainly in southern Utah and the Uintas at 6,000 to 8,000 feet. Other tree species such as Douglas-fir, white fir, aspen, pinyon, and juniper associate with ponderosa pine. Aside from important habitat for wildlife, ponderosa pine stands have provided excellent wood for the forest products industry.

Pinyon-juniper woodlands are widespread in Utah, usually from 5,000 to 7,000 feet in elevation. Colorado and singleleaf pinyon are often mixed with Rocky Mountain and Utah juniper. Many shrubs, forbs and grasses occupy sites between pinyon-juniper forests. These low elevation forests provide hiding cover and winter habitat for wildlife.

Forest Ownership
Approximately 64% of Utah's forested acreage is managed by the federal government. The remaining forested portions are comprised of state, tribal trust, private, and other miscellaneous public lands. Managing forest resources throughout the state is complicated because of the mixed patterns of ownership, various resource management objectives, and directives or regulations associated with public land.

Agents of Change

Fire is one of the most striking agents of change in Utah. Less dramatic, but with similar ecological impacts, are insects, diseases, and noxious weeds. Fire suppression has altered the occurrence, severity, and intensity of fire, and has contributed to increased insect and disease activity in certain forest types. Noxious and invasive weeds are spreading at an alarming rate, displacing native species, altering fire patterns, and disrupting ecosystem function.

Fire
Dense undergrowth and woody debris that accumulate in the absence of fire results in increased fire intensities. This can result in the loss of mature and more fire resistant trees that mightotherwise survive a fire.

Figure 2. Utah fire history by decade on state and private lands.

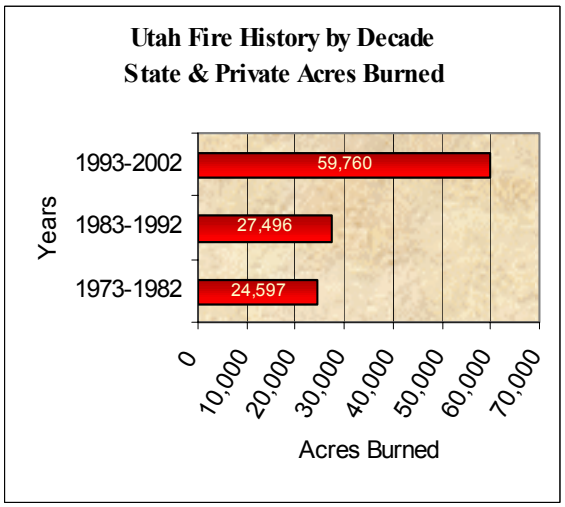
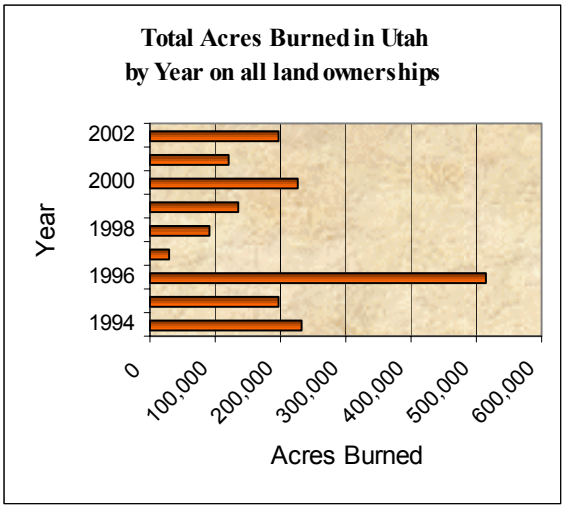


Figure 3. Total acres burned in Utah on all land ownerships from 1994-2002.

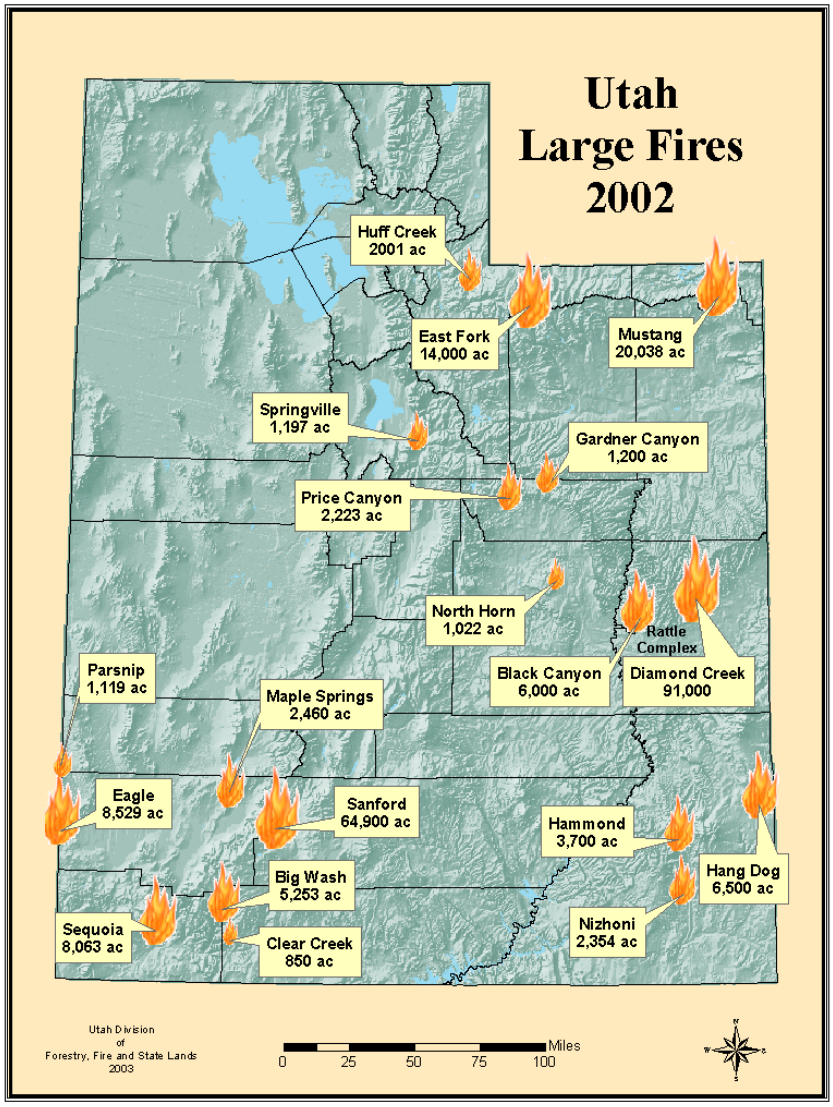


Ponderosa pine forests present an excellent comparison of current conditions with those of the mid-19th century. Many of the larger ponderosa pine trees would likely have survived lower intensity ground fires because of their thick bark and lack of lower branches. Today, without frequent fire or thinning, many of these forests are comprised of smaller diameter ponderosa pine and shade tolerant fir and spruce trees on sites with increased tree densities. When fire occurs on these mixed species and overstocked sites, it is often severe; ladder fuels provide a path to the tree crowns and crown fires result. High tree densities often place trees under stress as trees compete for available water and soil nutrients. Trees under stress are more susceptible to insect and disease attack.

Fire suppression and grazing practices in pinyon-juniper forests have produced sites with dense overstories and sparse understories. Slow recovery by displaced native understory species has provided an opportune environment for invasion by non-native species like cheatgrass. The introduction of cheatgrass into pinyon-juniper forests has resulted in more intense and more frequent fires. In the spring, cheatgrass produces seed and then dries by early summer, becoming very flammable. Because of its reproductive capabilities and ability to spread quickly, shorter fire intervals are associated with cheatgrass infested sites. These fires may decrease perennial shrubs and grasses while increasing annual plants, such as cheatgrass, that degrade site productivity and lead to a loss of pinyon-juniper forest type in some areas

Wildfire in Pinyon-Juniper Forest

Figure 4. Utah Large Fires, 2002



Beetles

Bark beetles kill more large trees annually than are lost due to wildfire in Utah. However, since landscape-level bark beetle-caused tree mortality may take years to develop; the visual effect on the landscape is more subtle in the short-term. Fire, on the other hand, results in visual changes that occur almost instantaneously. In either case, the result could be a landscape composed of thousands of dead trees.

Tree vigor is an important factor associated with tree susceptibility to attack by insects or

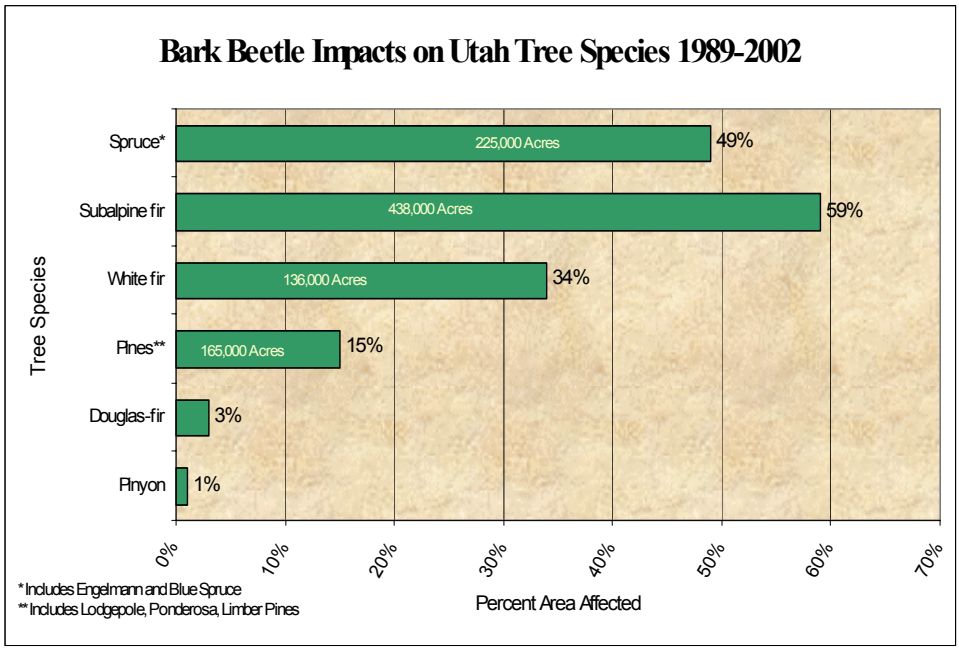
diseases. In a healthy forest, endemic levels of insects and diseases serve to remove weakened and stressed trees, thus thinning the forest and reducing competition for light, water, and nutrients. Overly dense forests composed primarily of larger diameter mature trees are less vigorous. Such sites are preferred by many species of bark beetles, which contributes to outbreaks. Large-scale insect outbreaks often result in an accumulation of down woody debris, which can increase fire intensity.

Examples of recent serious bark beetle mortality include spruce beetle and mountain pine beetle outbreaks.

Spruce beetle has caused the most noticeable forest die-off in the state since the late 1980s, especially in central and southern Utah. Forest Health Protection (FHP) surveys indicate that in the last ten to fifteen years, spruce beetle has caused up to 80% mortality on approximately 225,000 acres over three of Utah's National Forests.

In the 1980s, a mountain pine beetle outbreak on the Ashley and Wasatch-Cache National Forests, on the north slope of the Uinta Mountains, caused extensive lodgepole pine mortality. FHP aerial surveys conducted between 1983 and 1986 estimate that lodgepole pine mortality ranged from 70% to 90% on approximately 40,000 acres. In 2003, mountain pine beetle populations have reached outbreak proportions on the western edge of the Uintas on the Wasatch-Cache National Forest affecting approximately 25,000 acres.

Figure 5. Bark Beetle Impacts



Sidney Valley (Dixie National Forest) Before and After Spruce Beetle Outbreak

Currently, Douglas-fir beetle and pinyon *Ips* beetle populations are building, killing numerous trees in various locations throughout the state. In San Juan County alone, local agencies estimate that as much as 25% of the pinyon trees have been killed by drought and the pinyon *Ips* beetle.

Potential bark beetle impacts can be reduced by removing a proportion of the overstory to alter stand structure, encouraging age class and species diversity as new growth develops. In bark beetle affected landscapes, heavy mortality can adversely impact watershed, timber, wildlife, aesthetics, and recreational resources. Beetle mortality can also alter fuel loads, potentially resulting in high fire hazard over time.

Disease

Just as the impact of forest insects is more subtle than the impacts of a wildfire, the impact of forest diseases is more subtle than the impact of forest insects. Forest diseases can impact all portions of a tree, from the tips of the roots to the highest leaves. Often, forest diseases act slowly: killing small numbers of trees in any given year, rotting wood, attacking roots, and decreasing growth rate. However, over long periods, forest diseases can cause a profound impact on forest structure, composition, and the pattern of forest succession. With the exception of forests that have just experienced an outbreak of bark beetles, the impact of forest diseases over the lifespan of a forest is often more serious than that of forest insects or forest fire.

Dwarf mistletoe is one of the most prevalent and serious diseases of forest trees in Utah. Dwarf mistletoes are parasitic plants that grow on branches or stems of coniferous trees. Heavy dwarf mistletoe infections reduce tree growth and can cause tree mortality. For example, lodgepole pine heavily infected with dwarf mistletoe can have a 60% decrease in height growth, a 54% decrease in diameter growth, and an overall 79% reduction in volume growth. Survey results in all Utah National Forests in 1978 indicate the incidence of dwarf mistletoe infection was 24% in Douglas-fir, 20% in ponderosa pine, and 48% in lodgepole pine. A 1997 roadside survey of the Uinta Mountains showed over 60% of the lodgepole pine stands were infected with dwarf mistletoe.

Noxious and invasive weeds
Noxious and invasive weeds affect native ecosystems by reducing biological diversity, modifying wildlife habitats, altering fire and nutrient cycles, degrading soil structure, and damaging critical watersheds. In Utah, between 2.5 and 3 million acres are already infested, with an additional 350,000 new acres added annually. Utah has 18 declared noxious weed species and another 14 species classified as new and invading. The economic loss to Utah agriculture exceeds $34 million annually. In a recent Science magazine article, experts warn: *"Invasive noxious weeds are proving to be the single greatest threat to natural ecosystems in the West."* A greater effort is needed statewide to address this serious threat to Utah's agricultural and natural resources before the damage becomes irreparable.

Urban Forest Health
Few think of urban areas as forests, yet the trees growing in towns and cities are some of our most valuable forest resources. Urban forests enhance developed communities by providing beauty, shade, evaporative cooling, wind protection, and wildlife habitat. Trees absorb pollutants, slow stormwater discharge and enhance the durability of asphalt paving. Studies have indicated that urban areas with trees will increase shoppers' time and money spent in an area, reduce crime, increase community pride, and reduce traffic violations (speeding).

The health of these valuable urban forests is endangered by neglect and abuse. People plant trees not suited to our dry environment, they over- or under-water, and they damage trees during construction. Extended drought makes our urban forests more susceptible to native and introduced pests. Recent examples of severe urban tree health problems include the large numbers of ornamental spruces and pines that have been attacked and killed by spruce *Ips* and pine *Ips* beetles. Education and outreach is needed to inform the public and those who work with trees in cultivated landscapes about proper tree care, tree health, and tree selection.

Other Forest Health Issues

Drought
Prolonged drought stresses trees and can cause mortality. With an adequate supply of water, trees remain vigorous, which increases their ability to fight off diseases, to repel bark beetle attacks, or recover from defoliation. During droughts, natural defenses are weakened which increases the trees' vulnerability to insect attack or tree diseases.

Western states have been experiencing moderate to severe drought since 1999. Approximately 1.7 million trees have been lost to bark beetle attacks since 1999, often related to the effects of prolonged drought. *Ips* beetles in spruce and pine have caused considerable tree mortality in many urban areas in recent years. Even drought tolerant species like pinyon pine have succumbed to drought, with thousands of trees killed by the pinyon *Ips* engraver beetle since 2001.

Tree defoliation by Douglas-fir tussock moth and western spruce budworm has also increased since 1998, with approximately 57,000 acres affected. The loss of foliage combined with drought dramatically increases tree stress, predisposing them to attack by more aggressive insects and diseases. Hundreds of acres of deciduous trees damaged by late season frosts may also experience increased levels of stress made worse by prolonged drought.

In addition, recent efforts on some federal and private lands to re-vegetate, re-forest, or stabilize watersheds after intense wildfires have been largely unsuccessful due to drought conditions.

Fire Exclusion, Grazing and Plant Succession: Aspen Decline

Aspen forests cover 1.4 million acres in Utah today, but at one time may have covered as much as 2.9 million acres. Successful aspen regeneration is dependent on regular disturbances, like wildfire, wind, avalanches, insect attack, and wood harvesting, which stimulate the roots to produce new shoots. Fire suppression has reduced aspen regeneration and allowed conifers to seed in and replace aspen. As aspens age beyond 80 years, they become more susceptible to diseases and may not regenerate as well after disturbance. Without major fires or harvests that simulate fire, aspen stands will continue to decline. This change in forest type can have a considerable impact on water yield because the water use of conifer forests may be twice that of aspen. The combination of modern fire suppression and herbivory has prevented aspen regeneration in many forests; conifer understories are now widely overtopping aspen stands.

Forest Ecology

Forests develop through a process known as succession. Following a disturbance like fire, avalanche, or timber harvest that creates openings in the forest canopy, pioneer species such as aspen, which do well in full sunlight, grow into the disturbed area. Over time, these pioneer species grow and shade the site, creating a good environment for shade-tolerant species like firs. This replacement of pioneer species with more shade tolerant species is called succession. In Utah, succession has turned many aspen stands into fir stands, reducing our aspen cover by as much as 60% over the past century. This has resulted in loss of aesthetic values and reduced biological diversity. Only management that allows for periodic disturbances can reverse this process. Frequent, low intensity disturbances, also can reduce the likelihood of large-scale disturbances.

Management Difficulties

Proactive management to improve forest health can be difficult, whether the forests are public or private.

People's legitimate concerns about public forests have resulted in federal agencies trying to satisfy often conflicting legislative directions. Resource managers often don't have the flexibility to conduct treatments in a timely manner to keep forests healthy, like beetle infested tree removal or prescribed fire.

Management difficulties also have increased on Utah's private forests as many are converted to recreational subdivisions These new forest owners tend to focus on protecting trees and landscape aesthetics rather than forest management. This creates ownership patterns that make it difficult to treat large areas because of differing opinions among landowners and because of the

presence of structures. The result is drastically increased fire suppression costs and an inability to manage the forest on a landscape scale. Insects, diseases, and fires can move freely through these lands regardless of the action of the more knowledgeable or motivated landowners. The National Fire Plan along with Stewardship and Forest Health programs administered by the Division of Forestry, Fire and State Lands are helping, but progress is difficult.

How Did We Get Here?

Sundance

The forest health situation at Sundance, in Provo Canyon, is a good example of what we are facing across the state. Forest conditions in the Sundance area, though improving, pose a tremendous threat to lives, property, and the well-being of one of Utah's premier resort communities.

Sundance Canyon experienced significant disturbance associated with development early on. The extraction of wood fiber and grazing led to fire suppression and logging exclusion. The area became ripe for a large-scale natural fire or bark beetle outbreak. The narrow access road into the canyon coupled with years of unmanaged forest growth and luxury homes set the stage for catastrophic fire.

With planning and proactive management that exists there now, the risks of bark beetle outbreak or fire are reduced. Sundance was recently designated a Firewise community, one of only a few across the country.

Understanding Forest Disturbances: The Spruce Beetle Example

Although some would argue that the massive loss of mature spruce in Utah forests over the last 20 years is a natural condition, it is largely occurring in an unnatural forest; human actions and inactions over the last 150 years have greatly changed our forests. Human activities like logging and burning associated with settlement, followed by grazing and 100 years of fire suppression, have created the current conditions in our forests. Duplicating or even approximating pre-settlement conditions in these forests may not be possible or desirable.

Some scientists refer to the current levels of spruce tree mortality in Utah as an ecological rotation. This is similar to the idea of harvest rotation used by foresters, where tree species at a particular location are expected to mature to harvestable size in a certain number of years. Many scientists suspect that a similar die-off occurred in these spruce forests four to five hundred years ago. At that time, however, occasional fires occurred naturally and created openings in which younger trees grew, creating a diversity of ages and a more complex stand structure than is present today in many Utah spruce-fir forests.

Some people have asked if we could have stopped the spruce beetle invasion that decimated the Wasatch Plateau and Cedar Mountain/Brian Head area. Initial infestations were not treated, and it can not be known if treatment would have been successful. Had the outbreak been attacked with the urgency and resources used to mobilize for a wildfire, we could almost certainly have bought time to develop and implement strategies that may have reduced mortality and improved

forest health. The ideal scenario would have been to implement silvicultural treatments prior to an outbreak, removing a portion of the trees every 30 or so years to encourage an uneven-aged stand structure. Although such treated stands would still be susceptible to spruce beetle disturbance, the impacts would be reduced since the insect prefers large diameter, older spruce. Instead, we now have a spruce-fir forest where 80% to 90% or more of the larger spruces were killed by beetles in just a few years. Some foresters are concerned that the level of spruce mortality has resulted in a near total loss of a seed source needed to regenerate spruce in these forests.

What are the impacts?

Loss of Forests

Agents of change can cause the permanent loss of forest cover in some locations. For example, several generations of the Lister family have sought refuge from the heat of summer by escaping to their forested property on Cedar Mountain. Not fancy, just an old trailer that sits on a low ridge in a formerly beautiful quaking aspen stand. Over the past decade, however, the Listers have watched their beloved "quakies" die. Now the trailer sticks out on the mountainside like a sore-thumb, surrounded by dead trees with little to no regeneration. They have lost their shade, the aspen's benefit to wildlife, and many of the reasons why they visited their mountain property.

Water Quality and Soil Erosion

Utah is the second driest state in the nation, and population growth is causing greater demands for water. A significant loss of forest cover could have detrimental effects on people at the nearest water tap. Only about 10% of Utah's land base is covered with high elevation forests, but those forests are critical watersheds, protecting the quality and quantity of water, Utah's most precious resource. Watersheds need healthy vegetative cover to protect them from accelerated erosion. More fuel may lead to a more intense fire, which can cause greater damage to the soil. Loss of soil negatively affects vegetative cover and water quality.

Runoff in 2002 from the 2001 Mollie Fire – Santaquin, Utah

There is a high demand for housing development in forest watersheds. As the development occurs, areas are roofed and asphalted, and the water storage capacity of the soil is reduced. Likewise, the culinary water serving many areas is being used higher on the watershed, leaving less to serve the populations below.

Spruce Beetle Mortality, Brian Head, Utah

Wildland Urban Interface Concerns
Wildland-urban interface and developed forest conditions exist where human development meets or intermixes with wildland. In Utah, approximately 137,000 acres are considered to be in wildland-urban and developed interface conditions, and this acreage will continue to increase as our population expands. Parcel size also will tend to get smaller, making it difficult to ensure public safety and proper stewardship of these lands. As more people spend time or live within or in close proximity to the forest, there is greater need to proactively manage these forests, yet their management becomes more difficult.

Economics
Fire suppression is expensive. As development occurs in the interface, these costs will escalate. During the year 2002, nearly $15 million of state and county funds were spent in fire suppression. Federal agencies spent just over $67 million on fire suppression in Utah, which does not include the costs of rehabilitating these watersheds. The effects of fires, especially high intensity fires, can last for years. On the other hand, active management can include the harvest of wood products, which generate jobs and tax revenue. Not all areas can be harvested, but if managed properly, forests can produce indefinitely. Properly managed forests can encourage wildlife, increase water yield, and enhance aesthetics, while they produce wood products and improve local economies in perpetuity.

Recommendations for Action

Suppression
Suppression includes extinguishing wildfire or stopping an insect outbreak. Wildland fire suppression costs have increased tremendously due to the need to protect lives and property, and because of fuel accumulation. Fire suppression is still needed, however, because forests will burn, and lives and property will be threatened.

Although insect population suppression techniques have been used for decades, rarely are they applied with the vigor of fire suppression, even though over the last twenty years insects in all probability have killed more mature trees in Utah than fire. Many techniques employed today to suppress insect outbreaks are only stopgap measures used to buy time. These temporary treatments do not address the underlying issues of forest health, tree density, and the lack of

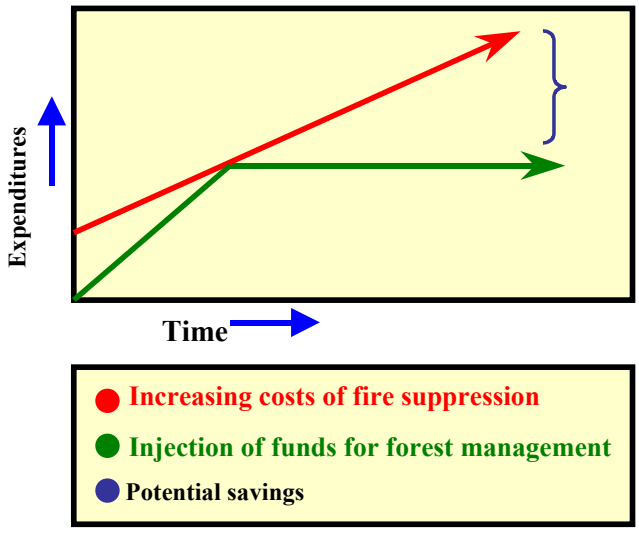
species and age class diversity. Regardless, suppression can only do so much. The key to long-term forest health is to couple suppression with prevention.

Prevention

Stand structure is one of the leading issues placing much of Utah's forests in the moderate to high hazard category susceptible to large-scale bark beetle and wildfire disturbances. A hands-off approach or strictly suppression will not work well. Active management, though, can prevent many fires or reduce fire hazard and severity, and even insect outbreaks can be made less severe.

Prevention strategies on selected landscapes remain an important component of addressing forest health issues. Though they can be expensive, Dr. Dennis Lynch from Colorado State University recently found that forest thinning and fuel treatment can occasionally pay for itself, and it is less expensive per acre than typical fire suppression costs. Investing in fuel treatment can be a hard sell, since fire suppression is demanding more-and-more money and prevention activities are not seen as emergencies. Over time, though, fuel treatments can reduce wildfire risk and suppression costs.

Figure 6. Investing in Management



Nationally, 89 million acres are at moderate to high risk of catastrophic wildfire. Since creation of the National Fire Plan two years ago, only 2 million acres have been treated. At this rate, wildfires will win. By investing up-front in forest management, we have the potential to reduce the escalating costs of fire suppression on catastrophic wildfires, as well as the impacts on precious resources (Figure 6).

Insect outbreaks also may be reduced or prevented by thinning to increase age class and species diversity. Thinning also can help prepare the forest for prescribed burns. Ideally, forest thinning should be done over large areas across all ownership boundaries. The challenge is to get landowners to cooperate with adjacent landowners to develop effective treatment strategies that minimize the effects of wildfire or insect outbreaks across large landscapes.

Recently landowner Britton Davis thinned a 250-acre mature spruce site located on the Wasatch Plateau to reduce the effects of an oncoming spruce beetle outbreak. Davis' biggest frustration was the inability of the adjacent national forest, to implement treatments on public land to enhance the effectiveness of his thinning treatment.

Preventive management also can ensure that local forest enterprises have a continuous supply of wood for products and jobs. Skyline Forest Products, in Escalante, Utah, has installed a MicroMill designed to handle smaller diameter wood often associated with forest health improvement projects. The Satterwhite Sawmill in Gunnison, Utah, sits within a short radius of thousands of standing dead spruce trees that are ideal for log homes. Unfortunately, the Satterwhite Mill is forced to purchase logs from Oregon and Canada to keep the mill in operation. Appeals and litigation have effectively stopped the harvest of dead spruce found on the adjacent public land. Even woodworking artists with the Southern Utah Forest Products Association have not been able to meet their needs because of an unreliable source of wood from Utah's forests. All of these businesses not only depend on Utah's forests for wood, but their willingness to buy wood can help make forest health projects economical and possible.

Research and Development
The USDA Forest Service, Forestry Sciences Lab in Logan is making a concerted effort to address a variety of forest health issues. They are studying interactions between wildfires and bark beetle populations, how temperature, host phenology, and elevation affects gypsy moth development and spread in Utah, and safer and more effective suppression tools like using insect pheromones to manipulate populations to protect high-value sites.

Summary: Call for Action

Improving the health of Utah forests will undoubtedly take decades to address. Prevention, suppression, education, technical and financial assistance, research and development are all components of a successful forest health strategy.

1. Land managers should have the opportunity to manage natural resources for sustainable benefits that meet the needs of a variety of our state and nation's citizens. Increased flexibility is needed to allow appropriate and timely action to deal with forest health threats.

2. Beetles, noxious and invasive weeds, and wildfires do not recognize property boundaries. Management action or inaction influences these agents of change, which in turn affects adjacent owners and resources. Landowners should be encouraged and allowed to work cooperatively to deal with threats to forest health.

3. There exists a need to address the current National Environmental Policy Act (NEPA) guidelines and internal review process implemented by the federal agencies which would allow emergency action exemptions from NEPA, not to exceed 250 acres, to address both insect and disease infestations and noxious weed invasions. Proper notice of action should be given by those agencies to U.S. Fish and Wildlife, Utah Division of Wildlife Resources, and local authorities.

4. Land managers need the opportunity to make up-front investments for healthy ecosystems, which will result in reduced expenditures for fire suppression.

5. Wildland-urban interface development affects fire suppression and prevention costs, watershed values, and other resources. Any new development on Utah's watersheds or in wildland urban interface areas should be in accordance with Firewise guidelines (www.firewise.org).

6. In revising National Forest or BLM Plans, where applicable, management direction should provide for the harvest or management of net annual growth. This could contribute to rural economies and reduce the accumulation of biomass. Utah's timber industry can enhance the effectiveness and viability of any forest health strategy by supplying the expertise and equipment to get the work done and a market for the wood removed. Without a continuous supply of wood, forest-based businesses are not viable. Efforts should be made to ensure a sustainable supply of wood to Utah's forest industry so we will have the means to carry out these plans.

7. Private landowners, county weed boards, and land management agencies need to take aggressive action for prevention and suppression of noxious and invasive weeds through proper management of vegetation for healthy ecosystems.

8. Areas affected by large-scale disturbance events such as fire, drought, or insects will require re-vegetation, reforestation, or watershed stabilization.

9. Implementation of the 10-year Comprehensive Wildfire Strategy of the National Fire Plan is needed (see www.fireplan.gov/10_yr_strat_pg_1.html), including the goals of improving wildfire prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance.